seems evident that the animal body is fundamentally molded by the energies of a double polarity, the one arising from the chemical character, and the other from the physical relations of protoplasm. The influence of external energies, strongly declared in the early phases of animal evolution, becomes less and less declared as the polar energies assert themselves, so that eventually the action of external force is confined to producing the minor, specific differences of organization; while the deep-lying, typical characteristics of organic form are due to the action of the polar energies.

And the character of the polarity specially referred to in this paper may be thus epitomized. Nutrition is primarily devoted to the growth and preservation of the individual animal, while its excess or overflow is directed to the reproductive pole, where it yields the germ of a new animal. Motor influence is primarily devoted to the vitality and activity of the individual animal, while its excess is directed to and retained in the sensory pole, where it forms the germ of a mental organism. The one flows posteriorly, the other anteriorly to their respective poles. The material germ is more matter than energy, the mental germ more energy than matter. The one is the ultimate of material or chemical complexity, the other of motor complexity. As compared with each other we may look upon the material germ as possessed of maximum matter with minimum motion; and the mental germ of minimum matter with maximum motion; their essential difference consisting in the complexity of material aggregation in the one, and of motor aggregation in the other.

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NOTE ON THE CLASSIFICATION OF MOTHS.

BY A. R. GROTE.

WHEN we take a general survey of the different classifications proposed by authors, we must be struck with the different ideas expressed with regard to the composition of families and sub-families. At a glance we see that the sub-families of the Bombycidæ and those of the Pyralidæ (as the last are arranged in the "New Check List") have a higher value than the divisions of the Noctuidæ and Geometridæ, as adopted by Guenée and Packard. They rest on peculiarly strong structural grounds,

having exclusive characters, and hence the effort of late to break up the Bombyces into distinct families. Thus disassociated, the general character of "form" as laid down by Agassiz neglected, the next step is to force them into unnatural positions, to displace the Hepialinæ, and rank them with the Castnians, or to produce such an arrangement as Von Heineman proposes. The "sub-families" of the Noctuidæ are, on the other hand, vague, and they shade into each other, in such a way, that it becomes a matter of choice where we assign the limit. The difficulty lies mostly with the Noctuidæ. Two groups, Bombyciæ and Noctuophalænidi, possess exclusive characters which have led to their being treated as distinct families by the German entomologists. In form these two small groups are decidedly noctuidous. The one closely resembles the higher, the other the Catocaline group of the Noctuidæ. Certain general assemblages, such as the Bombycoidea, Hadeninæ, etc., are, in a general way, admitted by Lederer, but he denies them a scientific basis, and discards them in the body of his work. Excluding the two groups above noted, he has no division of the family at all higher than a generic one. The same is true of Geometridæ, although here the divisions show more character. In the Pyralidæ, however, the sub-family groups are again strong. The existence of these sub-family groups are, perhaps, dependent on the general question of the development of the sub-order. The intermediate groups have fallen out and ceased to be perpetuated.

There is a certain parallelism between the Sphingidæ and Noctuidæ, apart from their usually naked larvæ, the hairy larvæ of the higher Noctuids having a Bombycid analogy which Butler recently regards as a real affinity.

The most natural classification of the Noctuidæ, seems to me yet that proposed in my "Check List of 1876," where I recognize three sub-family groups, the Noctuinæ and Catocalinæ of Dr. Packard and the Deltoides of Latreille; considering the other two groups, above mentioned, as having a higher than sub-family value. The difficulty lies in the existence of groups intermediate between family and sub-family divisions as hitherto assumed. In weighing the characters, the different values between these groups become apparent. Our terminology will have to be extended; but before this is undertaken, more precision must be attempted with the terms we have on hand.

With the Noctuidæ comparatively sharp division may be attempted between the Noctuinæ and Catocalinæ, yet an observer such as M. Guenée classified a catocaline form as a species of Heliophila, and I believe that an insect allied to Ophiusa has been recently described as a species of Tæniocampa, illustrating the difficulties of the task. The Deltoids, on the other hand, slide imperceptibly into the lower Catocalinæ. Here the tropical forms are so numerous and diverse, that the links seem yet existing and the value of this division is thus lowered below that of the two others. Yet the extremes, such as Catocala and Hypena, are readily distinguished.

I would regard the Bombycidæ in the light in which I gather the group is held by Dr. Packard, as a family of moths of ancient origin, and which, as it survives to-day, affords numerous synthetic sub-family groups, which should not be divorced from a family association; its classification may be considered as typical of the arrangement of other groups of moths. Starting with ideas derived from a study of the Bombycidæ, we shall be better prepared for an appreciation of the relationship existing between other groups of genera in nocturnal Lepidoptera. In the classification of the Noctuidæ it would seem best to hold a position intermediate between that of Guenée and Lederer, in order to avoid, on the one hand, the formation of sub-family groups which rest on slight characters and, on the other, to insure the recognition of the break which probably exists between the groups first indicated under the names of *Noctuæ nonfasciatæ* and *Noctuæ fasciatæ* by Borkhausen. The difficulty of studying the Noctuidæ is increased by the number of forms inhabiting North America and the other continents. Twenty-five years ago we had no more than a dozen species mentioned in our books, now we have about sixteen hundred. The number grows at the rate of from fifty to one hundred every year, as Western collections are received. They contain also structural forms which tend to break down the ideas of sub-families derived from the study of the European fauna alone. We have such a genus as Trichorthosia, for example, which, to the appearance of Orthosia, has the hairy eyes and untufted abdomen of Tæniocampa and the spinose tibiæ more especially characteristic of the genus Agrotis.